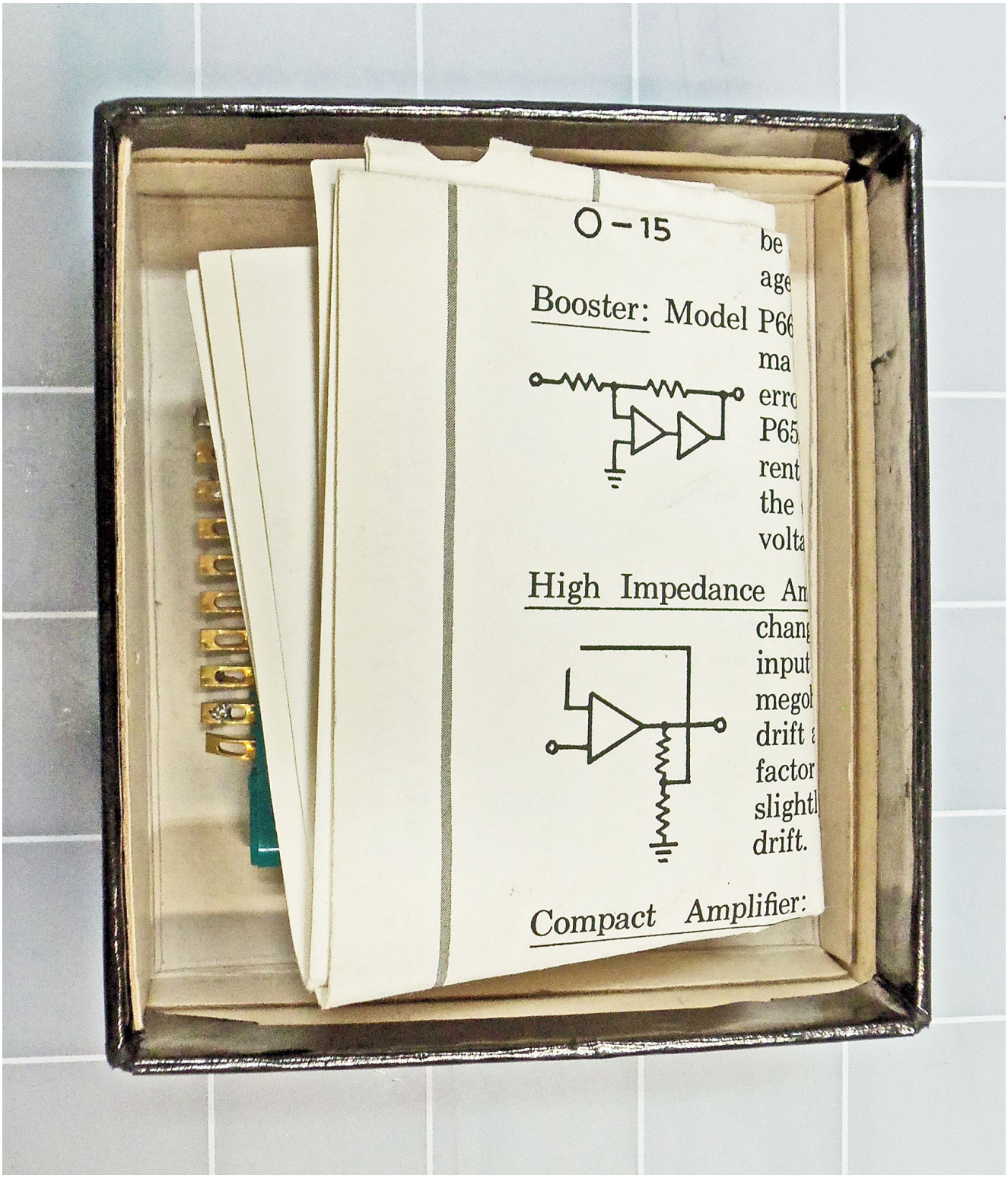
George A. Philbrick / Philbrick Research - P65 OPAMP Pictures
1962 All Solid State Modular OPAMP

PHILBRICK
RESEARCHES
P65
SOLID-STATE
OPERATIONAL
AMPLIFIER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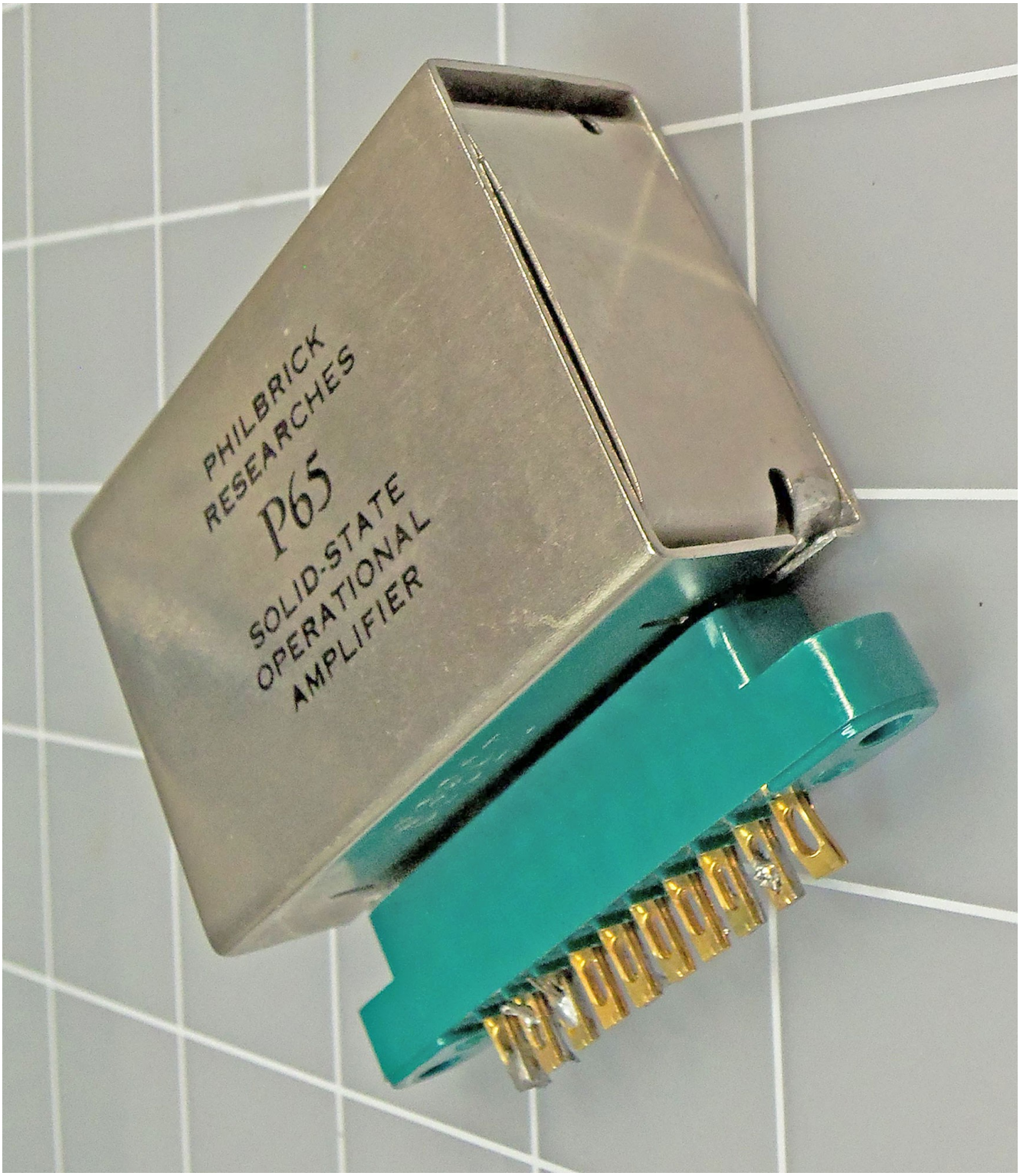
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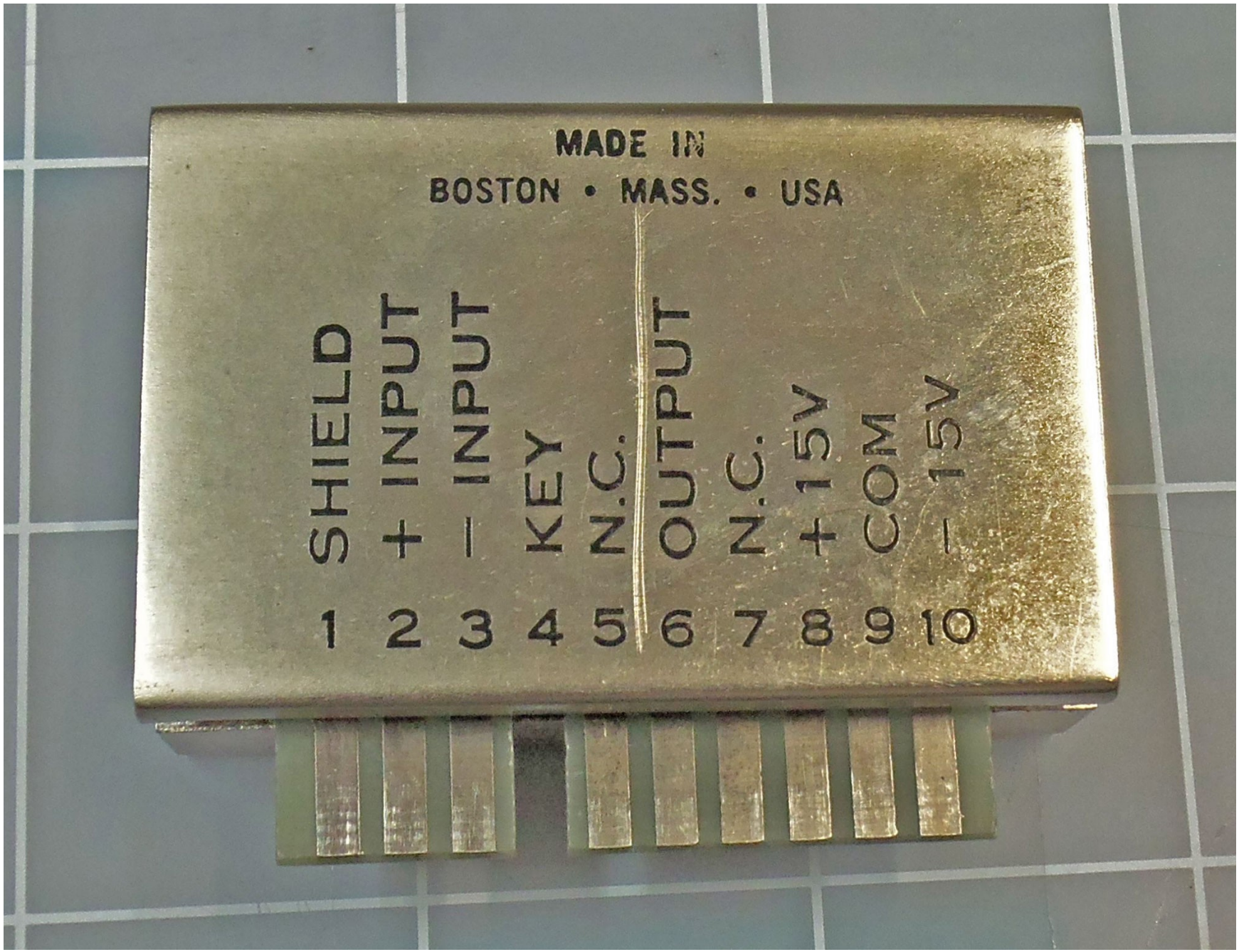
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BOSTON • MASS. • USA
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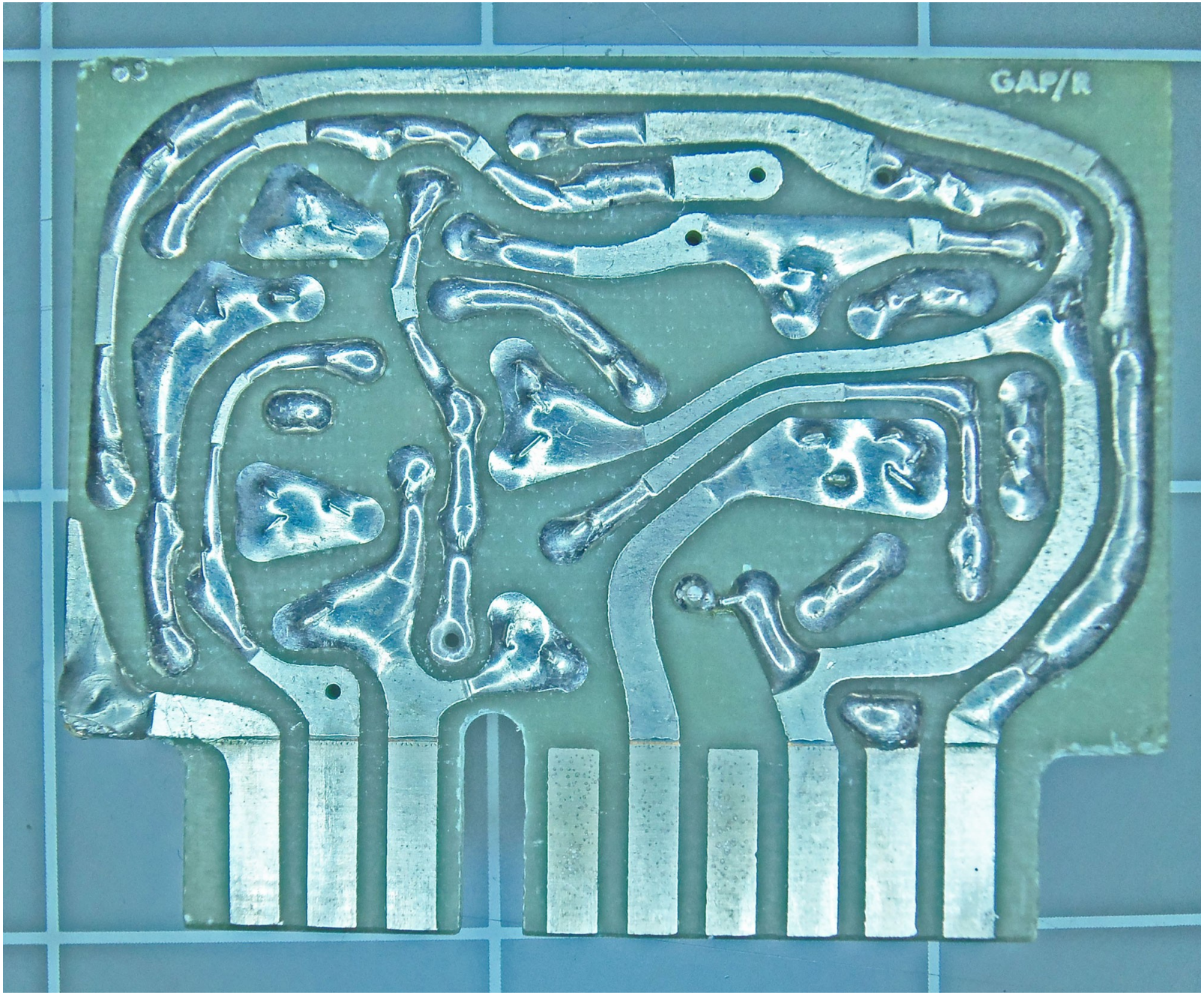
GAP/R

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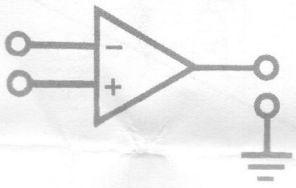
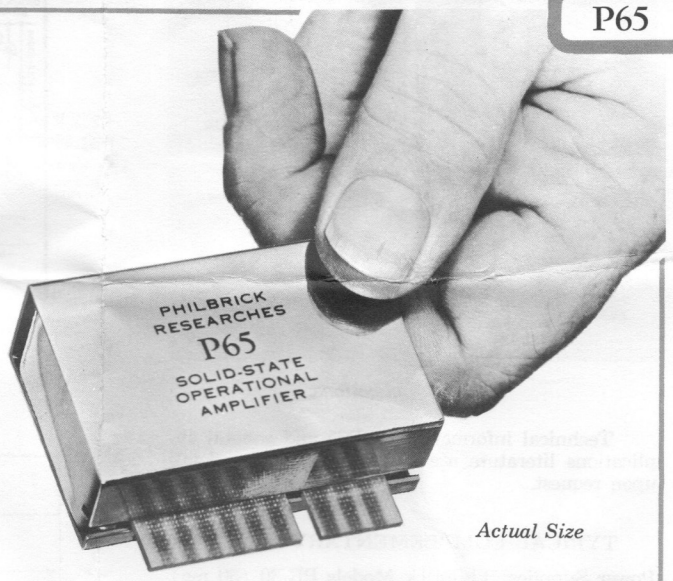
Model P65 Differential Operational Amplifier

GAP/R MODEL P65



Operational Symbol



Actual Size

GENERAL DESCRIPTION

Model P65 is an all silicon solid state unit designed for applications in instrumentation, computing, and control where plug-in versatility, low cost, long life, low power consumption, low noise, and operation at any temperature from −25°C to +85°C are desirable.

APPLICATIONS

Model P65 is a general purpose, low cost, plug-in unit of modest performance and wide utility. It is well suited for use in battery-powered equipment. It is especially useful for applications where reliability, long life, and cool operation are desirable. Its performance is optimum when used with feedback resistors in the range 10 K to 100 K, but it has been used successfully in many applications with feedback resistors of the order of megohms. It is unusually insensitive to capacitive loading and will operate stably under all conditions of resistive feedback. It can be used for the operations indicated in the Philbrick Applications Manual and other Philbrick applications literature.

GENERAL CHARACTERISTICS

GAIN: (dc open loop)
- Voltage: 10,000 min. 20,000 typical with 10 K output load
- Current: 400,000 typical at 25°C
- Transconductance: 2 mhos typical, 1 mho minimum

RESPONSE:
- Full output: 10 kilocycles (0.6 volts per microsecond)
- Small signal: greater than 1 mc unity gain bandwidth

OUTPUT:
- Voltage: ±11 v
- Current: 1.1 milliampere max.
- Impedance: Current source

INPUT:
- Initial offset voltage (25°C): adjustable to zero
- Voltage drift and noise: typically less than 10 μv per ½ hour; less than 50 μv per day (constant temp.); less than 10 mv (−25°C to +85°C)
- Initial offset current (25°C): less than 10^{-7} amp either input
- Current drift and noise, either input: typically less than 10^{-9} amperes per ½ hour; less than 10^{-8} amperes per day (constant temp); typically -150×10^{-9} amps (−25°C to +85°C)
- Impedance between inputs typically 100,000 to 200,000 ohms
- Impedance, either input to ground typically 10 megohms
- Common mode voltage error (input mismatch) 0.1% (−10 v to +10 v)

POWER REQUIREMENT: Plus and Minus 15 v at 4 ma

TEMPERATURE RANGE: Operating: −25°C to 85°C (hot spot); Storage: −55°C to 85°C (ambient)

DIMENSIONS: Case 2¼" w × 1½" h × ¾" deep (above mating Methode CD610S mating connector supplied with unit)

WEIGHT: Installed 2½ ounces; Packed 5½ ounces.

CONSTRUCTION: All silicon transistors, glass epoxy printed circuit card with keyed ten-contact nickel-rhodium plated edge connector, plated steel case.

ADJUSTMENTS: Recessed screwdriver zero voltage offset adjustment available at top of unit.

PHILBRICK MODEL P65 OPERATIONAL AMPLIFIER ISSUE DATE NOV. 1, 1962

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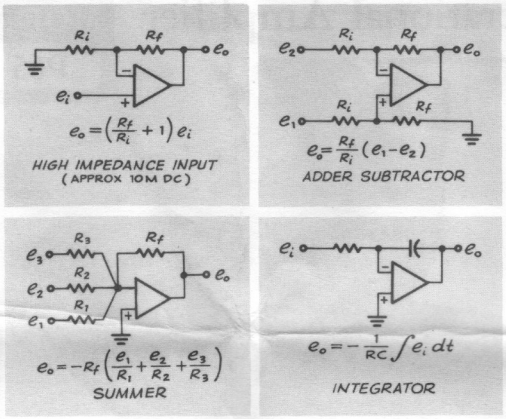
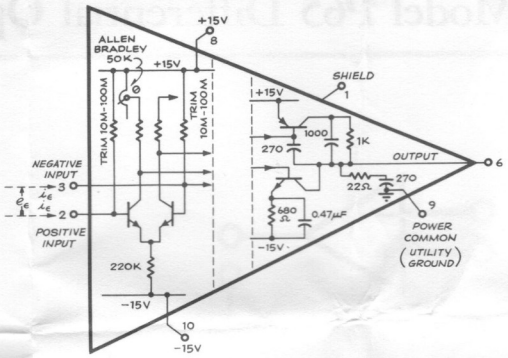


Typical Applications



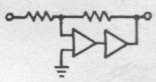
Simplified Schematic

Technical information on P65 and general applications literature are available in greater detail upon request.

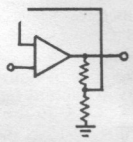
TYPICAL COMPLEMENTARY UNITS

Power Supplies: Philbrick Models PR-30 (30 ma) and PR-150 (150 ma) are specifically designed for energizing Philbrick solid state operational amplifiers; and the excellent regulation of PR-150 in particular may be used for obtaining reference voltage in precision computing systems.

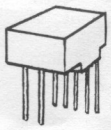
Booster: Model P66 may be used to obtain up to 20 ma at ±10 v output with negligible error when connected inside the P65s feedback loop. Being a current booster, it will also increase the current gain and dc open loop voltage gain of P65 circuits.



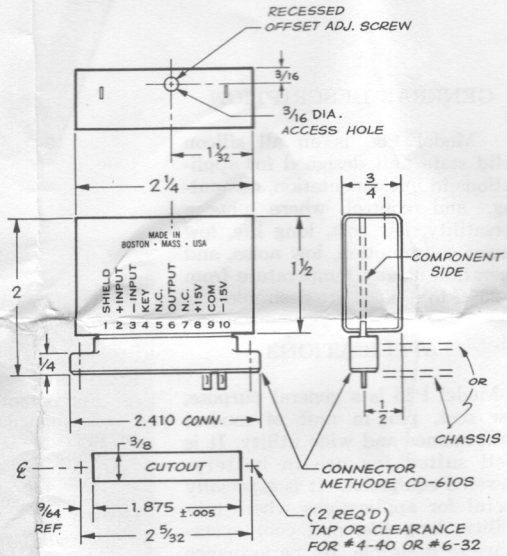
High Impedance Amplifier: Model 6151 is interchangeable with P65 physically, has input impedance better than 100 megohms to ground, has current drift and offset lower by at least a factor of 10 than P65, and is only slightly worse in voltage gain and drift.



Compact Amplifier: For printed circuit board mounting specify the ultra-compact PP65, 1⅛″ x 1⅛″ x ⅝″ high, epoxy-embedded, 1 ounce, leads spaced on standard 0.1″ grid, current and voltage trims omitted for versatility and even greater reliability. Otherwise electrically identical to P65. No extra cost.



For a demonstration of P65 or related equipment, or for advice on its applicability to your needs, write, wire, or phone Philbrick or your nearest GAP/R Representative.



Outline & Mounting Dimensions

SL/3M/263/Rev. 1A Printed in U.S.A.

GEORGE A.
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RESEARCHES, INC.
127 CLARENDON STREET, BOSTON, MASS.